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CERTAIN PROBLEMS OF ASTROPHYSICS

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(Conference at the Crimean Astrophysical Observatory)

Marking the completion of the first part of the construction of the Crimean Astrophysical Observatory, a conference was held in the new main building on certain problems of astrophysics closely related to the observatory's work.

The choice of the site for construction of the new observatory (the foothills of the middle zone of the Crimea, near Partizanskoye village) was determined by the atmospheric conditions being most favorable for the work of the big telescopes. The observatory at Simeiz which was demolished during the war has now been restored and forms a part of the new astronomical center.

Work at the observatory has been developing proportionately as buildings of priority construction come into use and instruments are installed. First to be installed was the double astrograph of Zeiss for photographing the sky both directly and with an objective prism, which is used mainly for investigations of a stellar statistical character. Next to be mounted was the largest reflecting telescope in Europe, having a mirror of 122 cm diameter. This telescope is equipped with a new spectrograph, constructed according to a system proposed by V. A. Al'bitskiy.

An extraeclipse coronagraph with interference-polarizational light filter of Gil'varga-Severnny has been installed for investigations of the sun. Electrical photometric observations are conducted on a new meniscus 50-cm telescope of the D. D. Maksutov system.

Observatory associates gained large possibilities for examination of the sun when the tower solar telescope was put into service.

The observatory has at its disposal at present 14 big instruments and a number of smaller installations. In cooperation with industry work is being done on the creation of a 2.6-m reflecting telescope.

Astronomers of the Soviet Union and foreign lands came to Partizanskoye on 19 September 1955 to participate in the conference on astrophysics. Among the guests were the well-known English scientist professor of the Royal Observatory M. Ellison, director of the Nanking Observatory Chiang Yi-che, and professor of Nanking University Dai Weng-sai, professor of the Astrophysical Institute in Paris D. Chalonge, vice director general of Indian observatories Anil Kumar Das, professor of the Breslau Observatory J. E. Mergenthaler, the Czechoslovak astronomers

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Z. Svestka and V. Vanysek, professor V. Dezso (Hungary), president of the Academy of Sciences in Heidelberg I. Kindle.

In opening the conference academician M. A. Lavrent'yev, academician-secretary of the department of physicomathematical sciences, emphasized the connection of astronomy with all fields of knowledge, its intimacy first of all with mathematics, physics, and chemistry.

M. A. Lavrent'yev cited a number of facts from the history of physics in the nature of examples of astronomy's striking connection with physics. The excited state of matter, the metastable conditions of atoms were first discovered by astronomers. In its turn physics gives astronomers the possibility of creating strict theories of the constitution of star atmospheres, of the interstellar gas, and dust. On the basis of nuclear fuel the first interplanetary plane will be built, affording the opportunity to verify whether the astronomers are telling the truth about the nature of the moon.

M. A. Lavrent'yev congratulated the Soviet astronomers on the opening of a new science center. He wished the observatory's scientific collective successful work and great achievements. In conclusion, he welcomed the Soviet scientists and foreign guests who had come to Partizanskoye for joint labors.

Then observatory director professor A. B. Severnyy delivered a report. He spoke about the history of the founding of the observatory, about the construction being promoted, the equipment and current efforts.

The observatory work is at present being conducted along 3 lines: the physics and cosmogony of diffuse nebulae and interstellar space, the physics of the sun and the influence of the sun on the earth, the physics and cosmogony of the stars. Noted in the report of A. B. Severnyy were the most significant of the completed works connected with application of the new technology of observation.

After the meeting the guests inspected the basic instruments of the observatory: the 120-cm reflecting telescope for spectroscopy of stars, the double 40-cm refractor with prism object glass, designed for investigating feeble stars, the 50-cm meniscus telescope with electrophotometric installations, the coronagraph for motion picture filming of active processes in the sun. The tower solar telescope, one of the largest in the world, aroused particular attention and interest among the delegates.

The following day was devoted to the problem of gaseous nebulae. Academician G. A. Shayn examined the connection between the extended form of light and dark nebulae and filaments and the polarization of radiation of stars from the viewpoint of the hypothesis of the presence of interstellar magnetic fields. It was shown that the plane of polarization of the light of stars corresponds to the orientation of extended nebulae, repeating it sometimes in details. This permits determining the local properties of the interstellar magnetic field, the intensity of which is such that it controls the distribution and movement of the diffuse matter in the galaxy, and also contributes to preserving the forms of its spiral

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shoots. The systematic orientation of filaments in the remnants of flashes of supernovae stars is apparently connected with the magnetic field of the star itself, carried out together with the shell.

In the report of doctor V. Vanysek (Czechoslovakia) about the velocities of bright stars and interstellar gas, the dispersion of velocities was compared with the mass of stars and clouds. As it was shown, the increase in the dispersion of star velocities with time is connected with the passage near them of diffuse masses, i.e., star and gas clouds. The variation of dispersion with distance can be associated with an error in determining the movements proper because of inaccurate accounting of absorption when evaluating distance. Doctor of physicomathematical sciences S. B. Pikel'ner reported on the study of the dynamics of diffuse matter, carried out in recent years. Three types of motion were investigated: shock waves, internal movements in nebulae, and movements of rarefied gas between clouds.

A new method of evaluating the distance of planetary nebulae, based on the hypothesis of the constancy of their mass, was proposed by doctor of physicomathematical sciences I. S. Shklovskiy. He succeeded in establishing that the nucleus of certain nebulae is analogous to a white dwarf. This permits drawing the conclusion that during formation of the planetary nebula the star undergoes rapid evolution, being converted from a giant to a white dwarf. Besides, diffuse matter enters the galaxy in quantities having cosmogonic importance.

Academician V. A. Ambartsumyan reported new data on the nature of the continuous emission of stars of the type of T Tauri. These stars, and also certain others, for example, dwarfs of the type of UV Ceti, display irregular variations of brilliance; the continuous emission conditioning them frequently overflows the line of absorption, reducing their relative depth.

Professor D. Chalonge (France) reported about new results of investigating the distribution of energy in the continuous spectrum of stars of the class O--F8. Near the line H a jump of O_H1 was observed, the reason for which is unclear. About A5 the jump disappears. The work done for stars of the main sequence is now being extended to the giants. A number of spectral singularities were recorded. The relative intensity of the red part of the spectrum in a red giant is greater than in other stars of the same spectral class. The cause of this perhaps consists in the big role of H⁻ in the atmosphere of the giant. Recorded also was a certain relative intensification of the ultraviolet part of the spectrum in stars having high velocity and possibly belonging to a spherical subsystem.

At the meeting devoted to the physics of the sun, A. B. Severnyy set forth certain problems associated with the results of investigations at the tower solar telescope of the Crimean observatory. It was discovered that the continuous and linear emission of flocculi and flashes is concentrated in small foci -- nuclei. The early stage of the development of a focus is characterized by an explosion of its own kind

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weakening of light in the earth's atmosphere, which permitted enhancing the accuracy of the fundamental photoelectric catalogues of stars, in particular the catalogue of bright stars. The method of 2-color diagrams which the author of the report developed made it possible to determine the color and color excesses of stars of early classes, and also to make more precise the law of interstellar absorption. Candidate in physicomathematical sciences P. P. Dobronravina and the author constructed a model of a stellar electrical spectrophotometer. By means of an electronic optical converter, A. A. Kalinyak, V. I. Krasovskiy, and the author obtained a photograph of the nucleus of the galaxy in infrared rays and determined its dimensions. The report of candidate in physicomathematical sciences E. S. Brodskiy told about work in the classification of spectra and determination of indexes of the color of weak stars (to 12th 5), which is being done by a group of associates in several sections of the Milky Way. The data obtained afford the possibility of defining the spiral structure of the absorbing matter. Cited in the report of E. R. Mustel' were certain results of work in the field of star spectroscopy obtained by the department of astrophysics by means of the 120-cm reflecting telescope. Investigations were conducted on the nature of what are called "metallic" stars, in which the lines CaII are anomalously weak. This phenomenon is to be explained apparently not by anomaly of physical conditions, but by a real deficit of calcium. The place of "metallic" stars in the diagram "spectrum - radiance" has been determined; other spectrometric works are also in progress.

The report of professor G. [Fic] Kindle (German Federal Republic) about labors in setting up a temperature scale of stars contained mainly general working principles and detailed data on the spectra of laboratory sources of light: the tungsten lamp, the positive crater of a carbon arc, the xenonic arc, the hydrogen lamp, fluorescent powder.

In conclusion participants of the Congress of the International Astronomical Union in Dublin spoke, reporting on the congress transactions. After the conference closed, a number of the guests participated in a trip to Simeiz to see the Simeiz section of the observatory and its instruments.

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